LESSON 12-4

Practice A

Inequalities

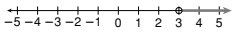
Choose an inequality for each situation.

$x > 10$	$x \geq 10$	$x < 10$	$x \leq 10$

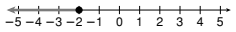
1. The temperature today will be at least 10°F. $x \geq 10$
2. The temperature tomorrow will be no more than 10°F. $x \leq 10$
3. Yesterday, there was less than 10 inches of snow. $x < 10$
4. Last Wednesday, there was more than 10 inches of snow. $x > 10$

Complete the graph for each inequality.

5. $a > 3$



6. $r \leq -2$

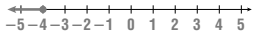


Graph each inequality.

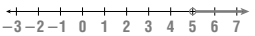
7. $w \geq 0$



8. $b \leq -4$

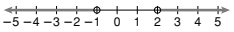


9. $j > 5$

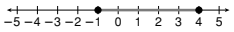


Complete the graph for each compound inequality.

10. $t > 2$ or $t < -1$

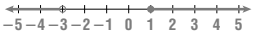


11. $-1 \leq f \leq 4$

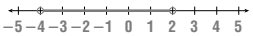


Graph each compound inequality.

12. $y \geq 1$ or $y < -3$



13. $-4 < p < 2$



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LESSON 12-4

Practice B

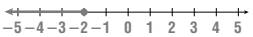
Inequalities

Write an inequality for each situation.

1. The temperature today will be at most 50°F. $x \leq 50$
2. The temperature tomorrow will be above 70°F. $x > 70$
3. Yesterday, there was less than 2 inches of rain. $x < 2$
4. Last Monday, there was at least 3 inches of rain. $x \geq 3$

Graph each inequality.

5. $t \leq -2$



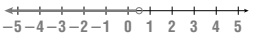
6. $j > -5$



7. $y \leq 0$



8. $b < \frac{1}{2}$

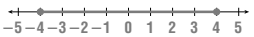


Graph each compound inequality.

9. $f > 3$ or $f < -2$



10. $-4 \leq w \leq 4$



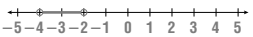
11. $b < 0$ or $b \geq 5$



12. $y \geq 3$ or $y \leq -1$



13. $-4 < m < -2$



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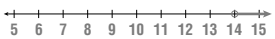
LESSON 12-4

Practice C

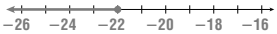
Inequalities

Graph each inequality or compound inequality.

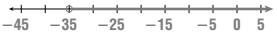
1. $x > 14$



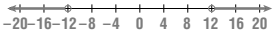
2. $t \leq -22$



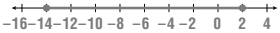
3. $j > -35$



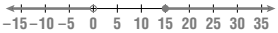
4. $f > 12$ or $f < -12$



5. $-14 \leq w \leq 2$



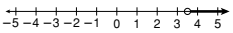
6. $b < 0$ or $b \geq 15$



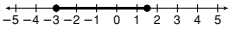
Write each statement using inequality symbols.

7. The number x is between -9 and -19. $-19 < x < -9$
8. The number y is at most 5. $y \leq 5$
9. The number g is greater than or equal to 4 or less than -2. $g \geq 4$ or $g < -2$
10. The number p is less than or equal to -8. $p \leq -8$

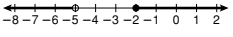
Write an inequality shown by each graph.

11. 

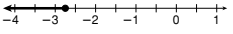
$x > 3.5$

12. 

$-3 \leq x \leq 1.5$

13. 

$x < -5$ or $x \geq -2$

14. 

$x \leq -2\frac{3}{4}$

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LESSON 12-4

Reteach

Inequalities

An equation is a statement that says two quantities are equal. An **inequality** is a statement that says two quantities are **not** equal.

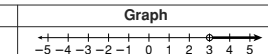
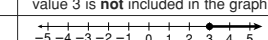
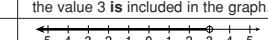
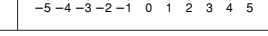
The chart shows symbols and phrases that indicate inequalities.

<	>	≤	≥
Less than	Greater than	Less than or equal to	Greater than or equal to
Fewer than	More than	At most	At least
Below	Above	No more than	No less than

Complete the inequality for each situation.

1. No more than 200 people can be seated in the restaurant.
   number of people seated in restaurant $\leq$ 200
2. The waiting time for a table is at least 20 minutes.
   waiting time $\geq$ 20 minutes
3. The price of all special dinner entrees is below $10.
   special dinner entrees $<$ $10
4. The Yoshida family spent more than $40 for dinner.
   Yoshida family spent $>$ $40

An inequality can be shown on a graph.

The graph shows:	Inequality	Graph
All numbers greater than 3	$x > 3$	 The *open circle* at 3 shows that the value 3 is **not** included in the graph.
All numbers greater than or equal to 3	$x \geq 3$	 The *closed circle* at 3 shows that the value 3 **is** included in the graph.
All numbers less than 3	$x < 3$	
All numbers less than or equal to 3	$x \leq 3$	

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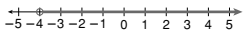
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LESSON 12-4 Reteach
Inequalities (continued)

Graph each inequality.

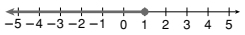
5. $x > -4$

- Draw an open circle at -4.
- Read $x > -4$ as "x is greater than -4."
- Draw an arrow to the right of -4.

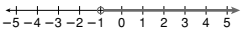


6. $x \leq 1$

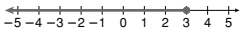
- Draw a closed circle at 1.
- Read $x \leq 1$ as "x is less than or equal to 1."
- Draw an arrow to the left of 1.



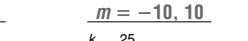
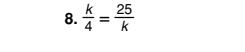
7. $a > -1$



8. $y \leq 3$



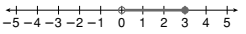
A **compound inequality** is a combination of two inequalities.

The graph shows:	Inequality	Graph
All numbers from -2 to 2	$-2 \leq x \leq 2$	
All numbers greater than 2 *or* less than -2	$x > 2$ or $x < -2$	

Graph each compound inequality.

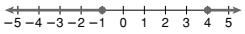
9. $0 < x \leq 3$

- Draw an open circle at 0 and a closed circle at 3.
- Shade the line between 0 and 3.



10. $x \geq 4$ or $x \leq -1$

- Draw a closed circle at -1 and a closed circle at 4.
- Shade the line to the left of -1 and to the right of 4.



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LESSON 12-4 Challenge
Square Equations

Some equations can be solved using square roots.

Example 1:

Solve $x^2 = 25$.

Think: $5^2 = 25$, and $(-5)^2 = 25$.

So, the equation has two solutions.

$x = -5, 5$

Example 2:

Solve $\frac{w}{2} = \frac{8}{w}$.

First, cross multiply: $w^2 = 16$.

Think: $4^2 = 16$, and $(-4)^2 = 16$.

So, the equation has two solutions.

$y = -4, 4$

Solve.

1. $x^2 = 64$

$x = -8, 8$

2. $y^2 = 81$

$y = -9, 9$

3. $n^2 = 121$

$n = -11, 11$

4. $a^2 = 49$

$a = -7, 7$

5. $m^2 = 100$

$m = -10, 10$

6. $s^2 = 169$

$s = -13, 13$

7. $\frac{c}{3} = \frac{3}{c}$

$c = -3, 3$

8. $\frac{k}{4} = \frac{25}{k}$

$k = -10, 10$

9. $\frac{e}{4} = \frac{16}{e}$

$e = -8, 8$

10. $\frac{9}{t} = \frac{t}{4}$

$t = -6, 6$

11. $\frac{16}{d} = \frac{d}{9}$

$d = -12, 12$

12. $z^2 - 1 = 35$

$z = -6, 6$

13. $p^2 - 5 = 20$

$p = -5, 5$

14. $h^2 + 14 = 63$

$h = -7, 7$

15. $29 + v^2 = 110$

$v = -9, 9$

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LESSON 12-4 Problem Solving
Inequalities

Write the correct answer.

The American College of Sports Medicine recommends exercising at an intensity of 60% to 90% of your maximum heart rate.

Heart Rates by Age

Age	Maximum Heart Rate	Target Range
20–24	200	120–180
25–29	195	117–176
30–34	190	114–171
35–39	185	111–167
40–44	180	108–162

1. Mara is 25 years old. Write a compound inequality to represent her target heart rate range while bike riding.

$117 \leq x \leq 176$

2. Leia is 38 years old. Write a compound inequality to represent the zone between her maximum heart rate and the upper end of her target range.

$167 < x \leq 185$

3. Rudy is 42 years old. Write an inequality to represent at least 70% of his maximum heart rate.

$x \geq 0.7 \cdot 180$; $x \geq 126$

4. Write a compound inequality to represent 60% to 90% of your maximum heart rate in ten years.

Possible answer: $120 \leq x \leq 180$

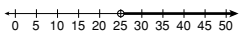
Choose the letter for the graph that represents each statement.

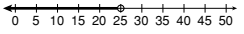
5. Alena decided to pay not more than $25 to get her old bike repaired.

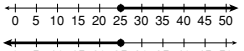
A I **C** III
B II **(D)** IV

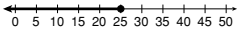
6. It was so cold last week that the temperature never reached 25°F.

F I **H** III
(G) II **J** IV

I. 

II. 

III. 

IV. 

7. There were at least 25 people ahead of Ivan in the cafeteria line.

A I **(C)** III
B II **D** IV

8. The garden yielded more than 25 pounds of potatoes.

(F) I **H** III
G II **J** IV

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LESSON 12-4 Reading Strategies
Connecting Words and Symbols

An **inequality** is a comparison of two unequal values. This chart will help you understand both words and symbols for inequalities.

The team has scored fewer than 5 runs in each game. "Fewer than 5" means "less than 5." Symbol for "less than 5": **$<$ 5**	No more than 8 people can ride in the elevator. "No more than 8" Means **"8 or less than 8."** Symbol for "less than or equal to 8": **$\leq$ 8**
Inequalities	
More than 25 students try out for the team each year. "More than 25" means **"a number greater than 25."** Symbol for "greater than 25": **$>$ 25**	There are at least 75 fans at each home game. "At least 75" means "75 or more" or **"a number greater than or equal to 75."** Symbol for "greater than or equal to 75": **$\geq$ 75**

Use the chart to answer each question.

1. What is an inequality?

a comparison of two unequal values

2. Explain the difference between the symbols $<$ and $\leq$.

The symbol $<$ means less than and the symbol $\leq$ means less than or equal to.

3. Explain the difference between the symbols $>$ and $\geq$.

The symbol $>$ means greater than and the symbol $\geq$ means greater than or equal to.

4. Write $<$, $>$, $\leq$ or $\geq$ to describe the number of students in each homeroom: There is a limit of 30 students for each homeroom.

$\leq$ 30 students

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